

Adopted Levels

$Q(\beta^-)=782.347$ I 2003Au03.

$Q(\beta^-)$: other: 782.33278 keV 5 from adopted (by 2004Ei01) mass(neutron)-mass(proton)=1293.3317 keV 5 and mass(electron)=510.99892 keV 4.

Neutron discovered by 1932Ch02.

Instability of free neutron first proposed by 1935Ch01.

The April 2004 conference (Gaithersburg, Maryland) proceedings published in the Journal of Research, National

Institute of Standards and Technology, Volume 110, No. 3 and 4, May-August 2005 is devoted to neutron measurements.

Reactions:

(e,e): 1982Ro12: measured magnetic form factor.

(p,p): 1978Ma33: measured proton polarization.

(pol p,p): 1985Ba30: measured spin polarization.

 1_0n Levels

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E(level)	J^π	$T_{1/2}$	Comments
0.0	1/2+	613.9 s 6	<p>$\% \beta^- = 100$.</p> <p>$\mu = -1.9130427$ 5 (2004Ei01).</p> <p>Electric dipole moment $d < 0.63 \times 10^{-25}$ ecm (2004Ei01, 1999Ha03).</p> <p>Mean square charge radius $\langle r^2 \rangle = -0.1161$ fm² 22 (2004Ei01).</p> <p>J^π: measurements: 1954St90, 1950Ha67, 1937Sc09.</p> <p>$T_{1/2}$: for free neutron decay, from evaluated mean lifetime=885.7 s 8 (2004Ei01). A recent measurement using an in-beam technique of trapped protons in a cold neutron beam gives mean lifetime=886.3 s 12 (stat) 32 (syst) (2005Ni13, also 2005Wi17). But another measurement using ultracold neutrons and gravitational trap gives mean lifetime of 878.5 s 7 3 (2005Es01, also 2005Se17) which differs by 6.5 s from the value adopted by 2004Ei01. Measurement by 2003Va04 using neutrons in a non-uniform magnetic field reports mean lifetime of 900.01 s 15, which represents an average of two sets of values: one set giving 886.95 s 15 and 888.87 s 15, the other set giving 911.08 s 15 and 913.01 s 15. Other: Mean lifetime=833 s +74-63 (2005Dz03).</p> <p>$T_{1/2}$: the value from 2004Ei01 represents an average of the following measured mean lifetimes: 886.8 s 12 32 (2003De25); 885.4 s 9 4 (2000Ar07, 2000Ar01); 889.2 s 30 38 (1996By03); reanalysis of 1990By05, 1989By04, 1980By01; 882.6 s 27 (1993Ma62); 888.4 s 31 11 (1992Ne11, 1989Kh07); 887.6 s 30 (1989Ma34, 1989Ma58, 1986Ag06); 891 s 9 (1988Sp05, 1978Bo42). Others: 881.0 s 30 (2000Pi04, preliminary result), 660 s +290-170 (2001Br15, magnetic trapping of ultracold neutrons); 888.4 s 29 (1990Al38); 893.6 s 38 37 (1990By05); 878 s 31 (1989Ko39, 1989Sc37); 877 s 10 (1989Pa27, 1989An15); 876 s 21 (1988La04); ; 903 s 13 (1986Ko36); 937 s 18 (1980By01); 875 s 95 (1980Ko47); 881 s 8 (1978Bo42) and 918 s 14 (1972Ch36, 1967Ch27). See reviews by 2004Ei01, 1995By02, 1992Sc02, 1990Fr20, 1989Er08 (also 1975Er10) for methods and other details used in these measurements. Earlier measurements: 1978Ku17, 1959Da06, 1959So15, 1951Ro25, 1950Ro15, 1950Sn68.</p> <p>$T_{1/2}$: Other references relevant to discussion of $T_{1/2}$ measurements: 1996Bo58, 1995Ig08 (also 1991Ig01), 1994Do27, 1991Ga06 (also 1990Ga32), 1990Gr06, 1984Li11, 1982Wi03.</p> <p>$T_{1/2}$: For bound neutron decay, mean lifetime $\langle \tau \rangle > 1.9 \times 10^{23}$ y (2004Ei01, 2004Ah03). Others: 2000Wa33, 2000Wa06, 1999Mc01, 1989Ph02. See also 'adopted levels' for ${}^1_0\text{H}$. Possible decay modes are listed in detail by 2004Ei01.</p> <p>μ: 2004Ei01 adopt value from 2005Mo16 (2002 CODATA (http://physics.nist.gov/constants) recommended value. Measurements are by NMR method: 1979Gr25 (also 1982Gr27, 1977Gr19), 1956Co57, 1949Ro15 (also 1950St88), 1948Bl29, 1938Po08. See also reviews by 2005St24, 1976Fu06 and 1969Full.</p> <p>Electric dipole moment measurements: 2001Fe10, 1999Ha03 (also 2000Ha09, 1998Va23, 1998Gr09), 1996Al25 (also 1992Al02), 1990Sm01 (also 1989Th08), 1986Al35, 1984Pe04 (also 1984Mo15), 1981Al10 (also 1980Al17), 1979Al30, 1973Dr12, 1970Ap01. Others related measurements: 2001Io03, 2000Sc09.</p>

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